

AMD Projects

Innovate • Transform • Protect

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CDC's Advanced Molecular Detection (AMD) initiative fosters scientific innovation to transform public health and protect people from disease threats.

AMD Projects: Better Pneumococcal Disease Vaccines

Harnessing next-generation sequencing to monitor changes in population-based pneumococcal disease

In 2000, children in the United States won the lottery — that is the vaccine lottery — with the introduction of a brand new pneumococcal conjugate vaccine that protects against 7 sets of strains (serotypes) of *Streptococcus pneumoniae* bacteria. Known also as pneumococci, these bacteria can cause life-threatening illnesses such as pneumonia, meningitis, and bloodstream infections.

Since this vaccine was introduced, the number of children younger than 5 years old who get invasive pneumococcal disease has dropped 89%. In fact, the vaccine performed so well that even adults benefited because no longer were so many kids carrying the bacteria in their upper respiratory tracts and passing it to others.

But other serotypes were taking advantage of the gap left behind, once the 7 serotypes covered by the pneumococcal conjugate vaccine had been nearly wiped out of circulation in the United States. CDC data were used in the development of the next-generation pneumococcal conjugate vaccine introduced in 2010. This vaccine protects against 13 serotypes, including 6 new serotypes that were not covered in the earlier vaccine.

To keep protecting future generations of children from disease, more extensive disease monitoring is critical to answer important questions. Is serotype replacement happening again? If so, what will these new serotypes look like? Will they be resistant to antibiotics? Will the current vaccine offer cross-protection against more than the 13 serotypes it directly protects against?

CDC will use whole genome sequence analysis to answer these pressing questions. This faster approach allows for predictions of promising vaccine candidate components while also detecting emergence of antibiotic-resistant mechanisms.



Immunization is one of the most important things a parent can do to protect their children's health. Today, we can protect children younger than two years old from 14 serious diseases.

